

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
3 February 2005 (03.02.2005)

PCT

(10) International Publication Number
WO 2005/009952 A2

(51) International Patent Classification⁷: **C07D**

(21) International Application Number:
PCT/US2004/023705

(22) International Filing Date: 23 July 2004 (23.07.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/489,550 23 July 2003 (23.07.2003) US
10/758,679 15 January 2004 (15.01.2004) US

(71) Applicant (for all designated States except US):
CHEVRON U.S.A. INC. [US/US]; Building T, Third
Floor, 6001 Bollinger Canyon Road, San Ramon, CA
94583 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **DAHL, Jeremy, E.**

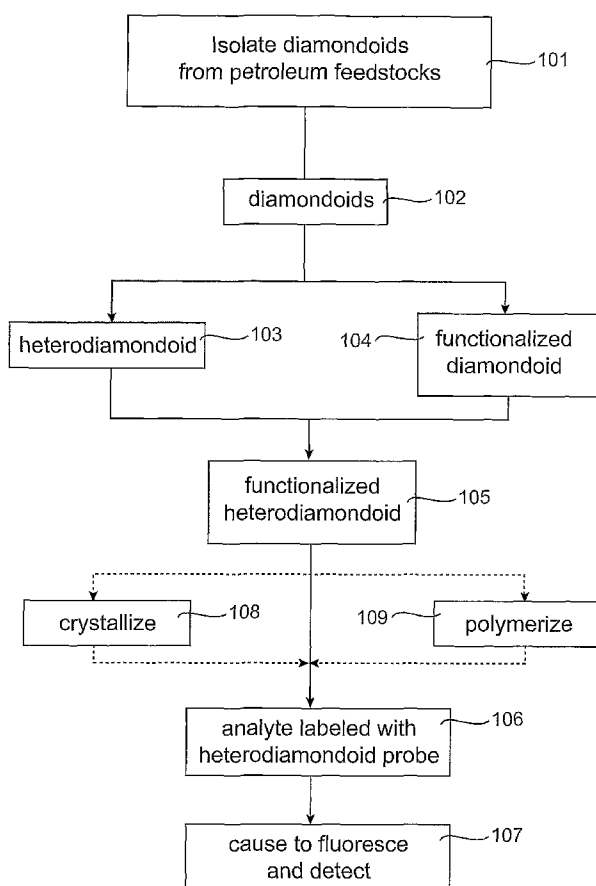
[US/US]; 977 Cottrell Way, Palo Alto, CA 94305 (US).
CARLSON, Robert, M. [US/US]; 3775 Roblar Road,
Petaluma, CA 94952 (US). **LIU, Shenggao** [CN/US]; 536
Rosewood Lane, Hercules, CA 94547 (US). **BOKHARI,**
Wasiq [PK/US]; 3915 Fair Oaks Avenue, Menlo Park, CA
94025 (US).

(74) Agents: **GESS, E., Joseph** et al.; Burns, Doane, Swecker
& Mathis, LLP, P. O. Box 1404, Alexandria, VA 22313-
1404 (US).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,

[Continued on next page]

(54) Title: PHOTOLUMINESCENT HETERODIAMONDOIDS AS BIOLOGICAL LABELS



(57) Abstract: Novel biological labels are disclosed herein. The label comprises a functionalized heterodiamondoid functioning as a biological probe, the probe having an affinity for a target analyte molecule. Upon absorption of incident excitation radiation, color center(s) located within the heterodiamondoid are caused to luminesce. The photoemitted light may be detected and analyzed to yield information about the analyte. The color centers in the heterodiamondoid will typically comprise nitrogen-vacancy and/or nitrogen-pore complexes, but may also comprise a dopant impurity atom such as a rare earth or transition metal element.



TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

- (84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations* AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM,

PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

Published:

- *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.